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EXAMINER	
FAN, CHIEH M	
ART UNIT	**PAPER NUMBER**
2638	

DATE MAILED: 09/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/975,636	Applicant(s) MOLNAR, KARL JAMES
	Examiner Chieh M. Fan	Art Unit 2638

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 July 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-48* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *4-9,12-18,23,24,27-33 and 37-48* is/are allowed.

6)☒ Claim(s) *1-3,10,11,19-22,25,26 and 34-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to the amendment filed 7/15/05.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-3, 10, 11, 19-22, 25, 26 and 34-36 are rejected under 35 U.S.C. 102(b) as being anticipated by Skold et al. (WO 98/38750, listed in the IDS filed 8/12/02, "Skold" hereinafter).

Regarding claim 1, Skold teaches a method of processing a received signal, comprising: receiving the signal (96 in Fig. 6) to provide a sequence of symbols associated with the received signal in respective ones of a plurality of symbol positions; identifying a known block of the sequence of symbols containing known symbol values and an unknown block of the sequence of symbols containing unknown symbol values (page 14, line 28 through page 15, line 3); determining a desired demodulation type for use in demodulating the unknown block based on the known symbol values (108, 136,

128, 118 in Fig. 6, note that the selector 108 output the signal 134 based on 102); detecting an interferer signal characteristic discontinuity location in the unknown block (page 15, lines 7-9); and demodulating the unknown block using a first selected demodulation type (128 in Fig. 6) between the interferer signal characteristic discontinuity and the known block and a second selected demodulation type (118 in Fig. 6) on another portion of the unknown block, the first selected demodulation type and the second selected demodulation type being selected based on the determined desired demodulation type for use in demodulating the unknown block and the detected interferer signal characteristic discontinuity (114 in Fig. 6).

Regarding claim 2, Skold further teaches selecting either non-interferer cancellation (128 in Fig. 6) or interferer cancellation demodulation (118 in Fig. 6) as the desired demodulation type for use in demodulating the unknown block.

Regarding claim 3, Skold further teaches estimating interferer signal characteristics for the known block and selecting either non-interferer cancellation or interferer cancellation demodulation based on the estimated interferer signal characteristics (106 in Fig. 6).

Regarding claim 10, Skold further teaches that the estimated interferer characteristics include at least one characteristic selected from the group consisting of desired signal carrier power, noise power, interference, signal power or a ratio calculated based on ones of desired signal carrier power, noise power, interference and signal power (page 17, lines 5-9).

Regarding claim 11, Skold further teaches detecting a plurality of interferer signal characteristic discontinuities and selecting an appropriate detector accordingly (page 7, line 26 through page 8, line 6).

Regarding claim 19, Skold teaches a system for processing a received signal comprising: a receiver that receives the signal to provide a sequence of symbols associated with the received signal (96 in Fig. 6) in respective ones of a plurality of symbol positions; an identification circuit that identifies a known block of the sequence of symbols containing known symbol values and an unknown block of the sequence of symbols containing unknown symbol values (page 14, line 28 through page 15, line 3); a determination circuit that determines a desired demodulation type for use in demodulating the unknown block based on the known symbol values (108, 136, 128, 118 in Fig. 6, note that the selector 108 output the signal 134 based on 102); a detector circuit that detects an interferer signal characteristic discontinuity location in the unknown block (page 15, lines 7-9); and a demodulator that demodulates the unknown block using a first selected demodulation type (128 in Fig. 6) between the interferer signal characteristic discontinuity and the known block and a second selected demodulation type on another portion of the unknown block, the first selected demodulation type and the second selected demodulation type (118 in Fig. 6) being selected based on the determined desired demodulation type for use in demodulating the unknown block and the detected interferer signal characteristic discontinuity (114 in Fig. 6).

Regarding claim 20, the desires demodulation type is selected from the group consisting of non-interferer cancellation (128 in Fig. 6) and interferer cancellation (118 in Fig. 6).

Regarding claim 21, the determination circuit is further configured to estimate interferer signal characteristics for the known block and selects the desired demodulation type based on the estimated interferer signal characteristics (106 in Fig. 6).

Regarding claim 22, Skold teaches that the interference is caused by co-channel interference (page 4, lines 1-5).

Regarding claim 25, the system comprises a mobile terminal (page 5, line 24-25).

Regarding claim 26, the system comprises a base station transceiver (page 5, lines 25-27).

Regarding claim 34, Skold teaches a system for processing a received signal, the system comprising: means for receiving the signal to provide a sequence of symbols associated with the received signal in respective ones of a plurality of symbol positions (76 in Fig.4, 96 in Fig. 6); means for identifying a known block of the sequence of symbols containing known symbol values and an unknown block of the sequence of symbols containing unknown symbol values (page 14, line 28 through page 15, line 3); means for determining a desired demodulation type for use in demodulating the unknown block based on the known symbol values (108, 136, 128, 118 in Fig. 6, note that the selector 108 output the signal 134 based on 102); means for detecting an interferer signal characteristic discontinuity location in the unknown block (page 15,

lines 7-9); and means for demodulating the unknown block using a first selected demodulation type (128 in Fig. 6) between the interferer signal characteristic discontinuity and the known block and a second selected demodulation type (118 in Fig. 6) on another portion of the unknown block, the first selected demodulation type and the second selected demodulation type being selected based on the determined desired demodulation type for use in demodulating the unknown block and the detected interferer signal characteristic discontinuity (114 in Fig. 6).

Regarding claim 35, Skold further teaches the means for selecting (108, 136 in Fig. 6) either non-interferer cancellation (128 in Fig. 6) or interferer cancellation demodulation (118 in Fig. 6) as the desired demodulation type for use in demodulating the unknown block.

Regarding claim 36, Skold also teaches the means for estimating interferer signal characteristics for the known block and selecting either non-interferer cancellation or interferer cancellation demodulation based on the estimated interferer signal characteristics (106 in Fig. 6).

3. Claims 1, 2,19, 20, 34 and 35 are rejected under 35 U.S.C. 102(a) as being anticipated by Chandrasekaran et al. ("A constrained least-squares algorithm with data adaptive beamforming and equalization for cochannel TDMA signals," Signal Processing 80 (2000), pages 2033-2047, listed in the IDS filed 8/12/02, "Chandrasekaran" hereinafter). Note that the Chandrasekaran paper was published in

October 2000, but the exact date is unknown. A rejection under 102(a) is made since it cannot be determined whether the paper was published more than one year or not.

Regarding claim 1, Chandrasekaran teaches a method of processing a received signal, comprising: receiving the signal (Fig. 2) to provide a sequence of symbols associated with the received signal in respective ones of a plurality of symbol positions; identifying a known block of the sequence of symbols containing known symbol values and an unknown block of the sequence of symbols containing unknown symbol values (Section 3.2.1, lines 1-7; Note that since the data structure is known as shown in Fig. 2, the edges of each slot are identified once the location of the training sequence in each slot is identified. Also see Fig.1 and the last 3 lines of the right column on page 2037); determining a desired demodulation type for use in demodulating the unknown block based on the known symbol values (Sections 3.2.2 and 3.2.3, especially equation 14; that is, the weights are determined from the training sequence); detecting an interferer signal characteristic discontinuity location in the unknown block (Section 3.2.1, lines 1-7, Fig. 1 and the last 3 lines of the right column on page 2037; As explained above, the edges of each slot and the location of the training sequence are identified.); and demodulating the unknown block using a first selected demodulation type (Section 3.2.2, especially the last 4 lines) between the interferer signal characteristic discontinuity and the known block and a second selected demodulation type (Section 3.2.3, especially the first 8 lines) on another portion of the unknown block, the first selected demodulation type and the second selected demodulation type being selected based on the determined desired demodulation type for use in demodulating the

unknown block and the detected interferer signal characteristic discontinuity (the selection depends on the location of the edges, e.g. k=162, 167).

Regarding claim 2, Chandrasekaran further teaches selecting either non-interferer cancellation (Section 3.2.2) or interferer cancellation demodulation (Section 3.2.3, lines 4-8) as the desired demodulation type for use in demodulating the unknown block.

Regarding claim 19, Chandrasekaran teaches a system for processing a received signal comprising: a receiver that receives the signal to provide a sequence of symbols associated with the received signal (Fig. 2) in respective ones of a plurality of symbol positions; an identification circuit that identifies a known block of the sequence of symbols containing known symbol values and an unknown block of the sequence of symbols containing unknown symbol values (Section 3.2.1, lines 1-7; Note that since the data structure is known as shown in Fig. 2, the edges of each slot are identified once the location of the training sequence in each slot is identified. Also see Fig.1 and the last 3 lines of the right column on page 2037); a determination circuit that determines a desired demodulation type for use in demodulating the unknown block based on the known symbol values (Sections 3.2.2 and 3.2.3, especially equation 14; that is, the weights are determined from the training sequence); a detector circuit that detects an interferer signal characteristic discontinuity location in the unknown block (Section 3.2.1, lines 1-7, Fig. 1 and the last 3 lines of the right column on page 2037; As explained above, the edges of each slot and the location of the training sequence are identified); and a demodulator that demodulates the unknown block using a first

selected demodulation type (Section 3.2.2, especially the last 4 lines) between the interferer signal characteristic discontinuity and the known block and a second selected demodulation type on another portion of the unknown block, the first selected demodulation type and the second selected demodulation type (Section 3.2.3, especially the first 8 lines) being selected based on the determined desired demodulation type for use in demodulating the unknown block and the detected interferer signal characteristic discontinuity (the selection depends on the location of the edges, e.g. k=162, 167).

Regarding claim 20, the desires demodulation type is selected from the group consisting of non-interferer cancellation (Section 3.2.2) and interferer cancellation (Section 3.2.3, lines 4-8).

Regarding claim 34, Skold teaches a system for processing a received signal, the system comprising: means for receiving the signal to provide a sequence of symbols associated with the received signal in respective ones of a plurality of symbol positions (Fig. 2); means for identifying a known block of the sequence of symbols containing known symbol values and an unknown block of the sequence of symbols containing unknown symbol values (Section 3.2.1, lines 1-7; Note that since the data structure is known as shown in Fig. 2, the edges of each slot are identified once the location of the training sequence in each slot is identified. Also see Fig.1 and the last 3 lines of the right column on page 2037); means for determining a desired demodulation type for use in demodulating the unknown block based on the known symbol values (Sections 3.2.2 and 3.2.3, especially equation 14; that is, the weights are determined from the training

sequence.); means for detecting an interferer signal characteristic discontinuity location in the unknown block (Section 3.2.1, lines 1-7, Fig. 1 and the last 3 lines of the right column on page 2037; As explained above, the edges of each slot and the location of the training sequence are identified); and means for demodulating the unknown block using a first selected demodulation type (Section 3.2.2, especially the last 4 lines) between the interferer signal characteristic discontinuity and the known block and a second selected demodulation type (Section 3.2.3, especially the first 8 lines) on another portion of the unknown block, the first selected demodulation type and the second selected demodulation type being selected based on the determined desired demodulation type for use in demodulating the unknown block and the detected interferer signal characteristic discontinuity (the selection depends on the location of the edges, e.g. k=162, 167).

Regarding claim 35, Skold further teaches the means for selecting either non-interferer cancellation (Section 3.2.3, lines 4-8) or interferer cancellation demodulation (Section 3.2.3, lines 4-8) as the desired demodulation type for use in demodulating the unknown block.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chandrasekaran et al. ("A constrained least-squares algorithm with data adaptive beamforming and equalization for cochannel TDMA signals," Signal Processing 80 (2000), pages 2033-2047, listed in the IDS filed 8/12/02, "Chandrasekaran" hereinafter) in view of Skold et al. (WO 98/38750, listed in the IDS filed 8/12/02, "Skold" hereinafter).

Chandrasekaran teaches the claimed invention (see the rationale applied to claim 19 above), but does not specify the system comprises a mobile terminal or a base station transceiver. Skold, in the same field of endeavor, teaches a system of canceling co-channel interference comprises a mobile terminal (page 5, lines 24-25) or a base station transceiver (page 5, lines 25-27). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to the interference-canceling system of Chandrasekaran in a mobile terminal or a base station transceiver, so as to cancel co-channel interference in the received signal of a mobile terminal or a base station transceiver.

Response to Arguments

6. Applicant's arguments filed 7/15/2005 have been fully considered but they are not persuasive.

(a) Beginning on page 21 through page 22 of the remark, the applicant argues that, with respect to the Skold reference, *there is no discussion or suggestion of using*

different types of demodulation for different portions of an unknown block as recited in independent method Claim 1. Furthermore, there is no discussion of detecting an interferer discontinuity "boundary" just the general presence of an interferer making joint demodulation beneficial. Furthermore, Claim 1 also recites using the first selected demodulation type "between the interferer signal characteristic discontinuity and the known block." The Office Action relies on item 118 of Skold as disclosing such recitations. Office Action, pp. 4-5. However, item 118 is a joint detector with no described ability to selectively apply itself to only portions of a received signal slot. Thus, it clearly provides no disclosure of using itself for a specific portion of a slot of a received signal, nonetheless the particular portion recited in Claim 1.

Response --- Skold teaches that the channel estimator forms a portion operable to extract the training sequences associated with one or more interfering signal component portions (page 15, lines 8-9). Since the training sequences associated with one or more interfering signal component portions are identified, the interferer discontinuity boundary is clearly detected. Further, in response to the argument that item 118 is a joint detector with no described ability to selectively apply itself to only portions of a received signal slot, the selection is performed by the selector 108 and the switch 136, not by the joint detector 118. The joint detector 118 (corresponds to "JD" in Fig. 2 of the instant application) is operable to detect jointly the wanted-signal component having the known training sequence and the one or more interfering-signal component portions associated with the one or more training sequences selected by the selector 108 (page 18, lines 4-8). Skold also teaches a single-channel detector 128

(corresponds to "CD" in Fig. 2 of the instant application) is operable to detect the wanted-signal having no interfering-signal component (page 18, lines 14-18; claims 11-14). The switch element 136 alternately connects the line 96 to either the joint detector 118 or the single-channel detector 128 (page 18, lines 25-26). The apparatus detects the receive signal jointly or singly, as appropriate (page 19, line 2). Therefore, Skold teaches using different types of demodulation for different portions of an unknown block.

(b) Beginning on page 22 through page 23 of the remark, the applicant argues that Chandrasekaran does not describe a difference type between a discontinuity and a known sequence.

Response --- By way of explanation, we will use the same example in Fig. 1 of Chandrasekaran as the applicant applied in his argument. If user 3 (symbol time 162 to 323) is a slot of a received signal to be processed. For convenience, let us assume the second training sequence begins at time x and ends at time y. Then the unknown block of user 3 is in the intervals [162, x-1] and [y+1, 323]. As indicated by the applicant, the interferer signal characteristic discontinuity occurs at time 167 (user 2) and 311 (user 4). Therefore, the unknown part between the interferer signal characteristic discontinuity and the known block is in the intervals [168, x-1] and [y+1, 310]. The so-called another part of the unknown block is then in the intervals [162-167] and [311, 323]. As admitted by the applicant, Chandrasekaran suggests that it is for the intervals [162, 167] and [311, 323] of slot 3 in Fig. 1 of Chandrasekaran that the second pass, as contrasted with the weighted beam form first pass (i.e., [168,310]), would use a different beamforming. Therefore, Chandrasekaran teaches demodulating symbols [168, 310] using a first

demodulation type and demodulating symbols [162, 167] and [311,323] using a second demodulation type. As the unknown part between the interferer signal characteristic discontinuity and the known block (i.e., in the intervals [168, x-1] and [y+1, 310]) completely falls in the range of [168,310], Chandrasekaran teaches demodulating the unknown part between the interferer signal characteristic discontinuity and the known block demodulated using a first demodulation type. Therefore, Chandrasekaran teaches the claimed limitation. The applicant may argue that the first demodulation type is also used to demodulate the known part [x, y]. Keep in mind that the claim only requires that the unknown part between the interferer signal characteristic discontinuity and the known block demodulated by a first demodulation type and the rest of (another part of) unknown block demodulated by a second demodulation type. How the known part is demodulated is out of the scope of the claim and is thus immaterial. Further, in response to the argument that the equalizer of Chandrasekaran only performs one type of demodulation, the demodulation is a general term that detect a desired signal from a receive signal that include an interfering signal (see lines 17-18 on page 1 of the instant application). In Chandrasekaran, the beam forming is part of the process to detect the desired signal. Since the first pass and the second pass of Chandrasekaran use different beam forming, Chandrasekaran's teaching meets the claimed subject matter.

Allowable Subject Matter

7. Claims 4-18, 23-33, and 37-48 are allowed.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chieh M. Fan whose telephone number is (571) 272-3042. The examiner can normally be reached on Monday-Friday 8:00AM-5:30PM, Alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chieh M Fan
Primary Examiner
Art Unit 2638

September 21, 2005